Summary

To develop a trajectory "picture," the analyst must look at the components considered in any model and consider the proceses outlined in this guide. The major components of any model will be:

Spill Data

- location of spill
- type of oil
- volume lost
- time/type of loss (instantaneous or continuous? stationary? moving?)

Environmental Data

- wind
- currents (large-scale, tidal, river flow, etc.)
- tidal heights
- diffusion

Some of the processes in this guide are typically not modeled well and the modeler must account for these in the uncertainty included in the final trajectory analysis:

- oil thickness
- convergences
- local variations on astronomical tides
- small-scale currents (i.e., around piers, small groins, or jetties)
- small-scale meteorology

Beaching oil that comes ashore

Biodegradation breakdown of oil by microbes into smaller compounds, eventually to water and carbon dioxide

Convergence areas where surface waters "come together." They are natural collection areas for oil, especially tarballs.

Diffusion large-scale turbulence that mixes spilled oil

Dispersion breakup of the oil into small droplets that are mixed into the water by sea energy. If the droplets are small enough, they remain in the water column.

Dissolution mixing of the water-soluble components of oil into the water

Diurnal tide coastal areas with one high tide and low tide each day

Emulsification small water droplets or water mixed into the liquid oil, thickening it to a "chocolate mousse" consistency. Water content often reaches 50-80%.

Evaporation conversion of liquid to a gaseous phase

Flotsam garbage, or detritus, on the water surface

Flushing turnover of water from an estuary or harbor

Freshwater-saltwater interface type of convergence formed when river water flows into the sea and spreads out over the seawater. Like tidal convergences, this interface is a natural collection area for oil.

Langmuir circulation wind induced water movement that leads to windrows, or streaks, of oil that dissipate and reform. This is a major mechanism for breaking up the slick and may be important for moving oil droplets into the water column.

Longshore currents produced by waves obliquely approaching gently sloping beaches.

Mixed, semi-diurnal tide two tidal cycles where the high water-low water sequences occur twice a day at different levels

Movement and fate the direction in which the spill moves, and the physical/chemical changes that occur to the oil over time

Neap tide the opposite of spring tides: the tidal range between high and low water is smallest and occurs near the first and last lunar quarters.

Observational data on-scene measurements (winds, currents, and oil location)

Photo-oxidation changes made by sunlight to a spilled oil's physical and chemical properties

Progressive wave energy is transmitted through the water, but water particles move in an oscillatory manner.

Refloating oil that has come ashore and re-floated off the shoreline

Sedimentation adhesion of oil to solid particles in the water column

Semi-diurnal tide two tidal cycles where the high water-low water sequences occur twice a day at the same level

Spring tide the very highest and the very lowest tide, which occurs twice a month when the moon is either new or full

Standing wave as a tidal wave reaches the end of a bay or estuary, it is reflected back toward the entrance.

Surface tension tendency for molecules to stick together and present the smallest surface to the air

Tarballs weathered oil that has formed a pliable ball. Size may vary from pinhead to 30cm.

Tidal excursion degree of influence of the tides on movement of the oil

Turbulent mixing random bulk movements of water, caused by high winds and currents, that tear oil slicks into smaller patches that are distributed over a wider area

Uncertainty "confidence limits," or the degree to which the spill forecast may be relied upon to be accurate

Viscosity a measure of fluids resistance to flow

Weathering changes in physical and chemical characteristics of spilled oil due to evaporation, dissolution, oxidation, sedimentation, and biodegradation

Length

	cm	m	km	in.	ft	mi
1 cm	1	10^{-2}	10^{-5}	0.3937	3.281×10^{-2}	6.214×10^{-6}
1 m	100	1	10^{-3}	39.37	3.281	6.214×10^{-4}
1 km	10^{5}	1000	1	3.937×10^{4}	3281	0.6214
1 in	2.540	2.540×10^{-2}	2.540×10^{-5}	1	8.333×10^{-2}	1.578×10^{-5}
1 ft	30.48	0.3048	3.048×10^{-4}	12	1	1.894×10^{-4}
1 mi	1.609×10^{5}	1609	1.609	6.336×10^{4}	5280	1

Area

	m^2	cm^2	ft^2	$in.^2$
1 m^2	1	10^{4}	10.76	1550
1 cm^2	10^{-4}	1	1.076×10^{-3}	0.1550
1 ft^2	9.290×10^{-2}	929.0	1	144
1 $in.^2$	6.452×10^{-4}	6.452	6.944×10^{-3}	1

Volume

	m^3	cm^3	li	ft^3	$in.^3$
1 m^3	1	10^6	1000	35.31	6.102×10^4
1 cm^3	10^{-6}	1	1.000×10^{-3}	3.531×10^{-5}	6.102×10^{-2}
1 li	1.000×10^{-3}	1000	1	3.531×10^{-2}	61.02
1 ft^3	2.832×10^{-2}	2.832×10^4	28.32	1	1728
1 $in.^3$	1.639×10^{-5}	16.39	1.639×10^{-2}	5.787×10^{-4}	1

Speed

	ft/s	km/h	m/s	mi/h	cm/s
1 ft/s	1	1.097	0.3048	0.6818	30.48
1 km/h	0.9113	1	0.2778	0.6214	27.78
1 m/s	3.281	3.6	1	2.237	100
1 mi/h	1.467	1.609	0.4470	1	44.70
1 cm/s	3.281×10^{-2}	3.6×10^{-2}	0.01	2.237×10^{-2}	1

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